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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,484	09/12/2000	Yasuo Tanaka	OKI 262	6834

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EXAMINER

FOONG, SUK SAN

ART UNIT PAPER NUMBER

2823

DATE MAILED: 03/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/660,484

Applicant(s)

TANAKA, YASUO

Examiner

Suk-San Foong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3,7-12 and 14-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3,7-12 and 14-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. The finality of the Office Action mailed on 11/12/02 is withdrawn in view of the new grounds of rejection below.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 3, 7-9, 11, 12, 16, 17, 19 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty ('569) in combination with Honda et al. ('659).

Chakravorty teaches a method of forming plurality of metal bumps on semiconductor wafer which includes providing wafer 301 with plurality of integrated circuit (IC) chips 302 (Col. 7, lines 45-47, and Fig. 2), forming contact pads 304 on IC chips 302 (Col. 7, lines 49-54), then forming metal layers 307 and 310 to electrically connect to contact pads 304 (Col. 8, lines 32-56), depositing metal bumps 311-1 over metal layer 310 (Col. 8, lines 57-61 and Fig. 5A) and optionally reflowed to form partial spherical bumps 311 as shown in Fig. 5B (Col. 9, lines 31-54), subsequently encapsulating wafer 301 with encapsulant layer 312 by using methods such as transfer molding using epoxy resin, laminating with dry film of polyimides or polymeric materials (Col. 9, line 55 to Col. 10, line 7, and Fig. 8B), then polishing encapsulant layer 312 to expose top portions of bumps 311 (Col. 11, lines 1-12), then forming external terminals 314 over bumps 313 (Col. 11, lines 19-25, and Fig. 8D), and dividing wafer 301 into individual chips (Col. 12, lines 21-22).

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Chakravorty does not disclose the step as recited in claim 1, lines 8-11.

Chakravorty does not disclose the step as recited in claim 2, lines 15-22.

Honda et al. discloses a method of forming a laminating film for semiconductor packaging devices which includes providing BT substrate 1 or silicon chip 4 with metal bumps 3 (Col. 16, lines 40-42, and Figs. 1-3), subsequently placing a sheet of encapsulating material 2 containing an epoxy resin with a curing agent and various additives such as flame retardants having a curing temperature over main surface of substrate 1 or silicon chip 4 (Col. 12, lines 18-19, 30-32, Col. 16, lines 36-37, 58-60), then heating sheet of encapsulating material 2 at a temperature lower than the curing temperature of sheet encapsulating material 2 for a period of time and at a reduced pressure lower than atmospheric pressure (Col. 16, lines 28-29, 47-50 and 58-62), and subsequently increasing the temperature to the curing temperature or higher of the sheet encapsulating material 2 (Col. 16, lines 42-45, 53-56, 64-67).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Chakravorty with Honda et al. because it would enable formation of encapsulant layer 312 of Chakravorty to be performed and obtain further advantage of having a semiconductor device of improved heat resistance, moisture resistance, low stress property and minimized void content (Honda et al., Col. 3, lines 5-11).

In regard to the step recited in claim 9, lines 19-23, it would have been within the scope to one ordinary skill in the art to change the pressure to a sufficient amount that would be insufficient to materially alter the disclosed process which is encompassed by the claim.

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4. Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty ('569) in combination with Honda et al. ('659) as applied to claims 3, 7-9, 11, 12, 16, 17, 19 and 22-24 above, and further in view of Teranuma et al. ('217).

The combination process does not disclose the step as recited in claim 10, lines 1-4.

Teranuma et al. teaches a method of forming a semiconductor device which includes providing a sheet of conductive adhesive layer 5 comprised of thermosetting adhesive 7 such as epoxy resin (Col. 10, lines 18-37, Figs. 1A, 1B and 13), then covering conductive adhesive layer 5 over surface of substrate 1 from the end of the sheet of conductive adhesive layer 5 (Col. 11, lines 25-34, and Fig. 2A), subsequently bonding second substrate 2 to substrate 1 via conductive adhesive layer 5 by bonding substrates 1 and 2 from the ends in order to prevent the surfaces of substrates 1 and 2 from catching air bubbles (Col. 11, lines 35-42, Col. 12, lines 34-38, and Fig. 2B), and then heating and curing sheet of conductive adhesive layer 5 (Col. 11, lines 4-7, Col. 11, line 43 to Col. 12, line 16).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Teranuma et al. with the combination process because it would enable formation of encapsulant layer 312 over wafer 301 to be performed and obtain further advantage of preventing air bubbles from being caught (Teranuma et al., Col. 11, lines 15-17).

5. Claims 14, 20 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty ('569) in combination with Honda et al. ('659) as applied to claims 3, 7-9, 11, 12, 16, 17, 19 and 22-24 above, and further in view of Tsukagoshi et al. ('728).

The combination process does not disclose that the curing agent is enclosed in a capsule and broken at curing temperature.

Tsukagoshi et al. discloses a method of forming sheet encapsulating material for semiconductor packaging devices which includes forming a sheet of epoxy resin with a curing agent enclosed in a capsule (Col. 9, lines 24-55) wherein the capsule is ruptured or broken under curing temperature (Col. 3, lines 56-59, Col. 10, lines 3-26).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Tsukagoshi et al. with the combination process because it would enable formation of encapsulant layer 312 of the combination to be performed and obtain further advantage of satisfying requirements for good keeping quality and quick curing performance to improve workability (Col. 11, lines 34-37).

6. Claims 15, 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty ('569) in combination with Honda et al. ('659) as applied to claims 3, 7-9, 11, 12, 16, 17, 19 and 22-24 above, and further in view of Komiyatani et al. ('915).

Komiyatani et al. discloses a method of forming a thermosetting resin such as epoxy resin for semiconductor devices (Col. 2, lines 11-13) with the addition of additives such as curing agent (Col. 4, line 20), flame retardant and anti-foaming agent for prevention of void generation (Col. 5, lines 23-26).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Komiyatani et al. with the combination process because it would enable formation

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of encapsulant layer 312 of the combination process to be performed and obtain further advantage of preventing void generation (Komiyatani et al., Col. 5, lines 24-25).

Conclusion


7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

March 18, 2003


George Fourson
Primary Examiner
Art Unit 2823